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which I have observed in a living condition without stains, the appearance being in this case checked with stained preparations. The sperms were active and the head and tail wriggled in their characteristic manner as long as they were visible. The tail became shorter and shorter as the head swelled, but in none of my specimens did the tail-cytoplasm completely incorporate itself into the head. This is true, I believe, for Loeb and Bancroft's experiments. In other words, a completely rounded out cell, like a spermatocyte, did not appear in these preparations.

De Meyer succeeded in causing the heads to swell by growing the sperms in a dilute solution of gelatin (*gelatin sol*); every indication pointed to the perfect imitation of the formation of the pronuclear condition in a normally fertilized egg. It is of the greatest interest, too, to observe that the experiments made by De Meyer in acid solutions gave exactly the same result as colloidal solutions in general—that is, a swelling in acid media.

These experiments and those of Loeb and Bancroft show the possibility of approaching the explanation of the behavior of the spermatozoon during fertilization upon physical-chemical grounds. Factors leading to mitosis should be determined and the various artificial parthenogenetic reagents should be tried.

I have recently determined, also, that if a trace of saponin be added to the water in which the spermatozoa of *Cerebratulus* lie, there is a slight cytolysis and swelling of the head of the spermatozoon, but the "tail" is not affected, apparently. Whether mitosis can be induced in this manner, as it can in the egg, in the formation of polar bodies, as I have elsewhere described, remains yet to be determined.<sup>3</sup>

MAX MORSE

TRINITY COLLEGE,  
HARTFORD, CONN.,  
April 10, 1912

<sup>3</sup> I am under obligation to the officers of the biological laboratories of Yale University, Professors Harrison, Coe, Woodruff and Petrunkevitch, for the opportunity to study living nemertean eggs and sperms.

#### SOCIETIES AND ACADEMIES

RESEARCH WORKERS IN EXPERIMENTAL BIOLOGY,  
WASHINGTON, D. C.

At the meeting of this society, held on February 21, 1912, Dr. William N. Berg, of the Bureau of Animal Industry, gave a critical exposition of Zuntz's theory in regard to the physical-chemical basis of striated muscle contraction,<sup>1</sup> in which it was pointed out that this theory had many objectionable features. These may be summarized briefly as follows:

(a) Lymph contains practically no carbon dioxide in the gaseous state.

(b) Gases dissolved in water do not behave entirely like true solutes, and exert no osmotic pressure; exceptions are hydrochloric acid, ammonia and a few other gases.

Accordingly, the carbon dioxide produced by muscle contraction can not exert any osmotic pressure, and, furthermore, it is not shown in Zuntz's work that the walls of the muscle rods are impermeable to carbon dioxide during the contraction phase. This is necessary, for otherwise osmotic equilibrium could not be brought about by the inflow of water alone; an outflow of carbon dioxide must take place. A further objection is that carbon dioxide at the moment of its formation does not have a temperature of nearly 6000° C.

At the March meeting, held on the 20th inst., Dr. William Salant, chief of the pharmacological laboratory of the Bureau of Chemistry, gave a brief résumé of the caffeine investigations which were conducted in the Department of Agriculture, and which embrace studies on the effects of different amounts of caffeine upon the organism, with especial reference to the production of acute and chronic intoxication. Other factors, such as the influence of diet, age, season, etc., were considered.

In conjunction with the tests, which were done with carnivorous and herbivorous animals, the rate of demethylation of caffeine and the elimination of caffeine in the urine and gastro-intestinal canal were noted under normal and pathological conditions.

In addition to the above, the results of experiments upon the effect of caffeine upon the circulation, with particular regard to synergism and the antagonism of other drugs, were reported.

LEWIS W. FETZER

<sup>1</sup> "Die Kraftleistung des Tierkörpers; eine Festrede," Kgl. Landw. Hochschule Berlin, 1908.

## THE HELMINTHOLOGICAL SOCIETY OF WASHINGTON

THE eleventh regular meeting of the society was held at Mr. Crawley's residence on April 16, 1912, Mr. Crawley acting as host and Dr. Graybill as chairman.

In connection with Dr. Ransom's notes on cysticerci, Dr. Cobb called attention to a remarkable case of hydatid disease in Australia, where a man who had had a considerable part of the liver removed, owing to a hydatid infestation, subsequently returned for operative removal of another hydatid. It was found on operation that the second parasite was in another part of the liver and that there had been a practically complete regeneration of the excised portion of the liver.

The evening was devoted to the exhibition and discussion of apparatus, drawings and specimens by Dr. Cobb.

A set of screens for collecting free-living nematodes was shown, the screens being oblong instead of circular, and therefore easier to pack in a suitcase in field work. Two screens using a detachable silk bolting-cloth, instead of an attached brass-wire screening, have a new fastening device consisting of a string looping around projections from the tins. A wooden container for holding collecting bottles fits inside of the screens and of some collecting trays of the same shape as the screens.

Dr. Cobb remarked that he had secured superior results by using sea water in his sublimate fixing reagents, nematodes staining very much better after such treatment. He suggested that this might be due to traces of various chemicals in the sea water, rather than to an increased solubility of the sublimate used.

In connection with a number of specimens and drawings of nematodes, Dr. Cobb pointed out that there is a possibility that some of the free-living forms will be found to show traces of internal segmentation in the arrangement of the internal organs and their relation to the external markings. In an undescribed genus he noted the association of a strong buccal spear with a weak pharyngeal suction bulb, and surmised that the retrorse annulation in this form served to hold it in a tangle of vegetation so that the buccal spear could be used effectively in the absence of a strong suction bulb to fix the mouth in using the spear. In this genus the buccal spear is lost by the male in an ecdysis.

Dr. Cobb expressed the opinion that the study of nematodes will have to be separated from para-

sitology or helminthology as covering a field of size and importance equal to that of such subjects as entomology. The nematodes make up an isolated group with a very wide range of morphological structure, life history, habits and geographical distribution. The group includes parasites of vertebrates and invertebrates, parasites of plants on land and in water, free-living forms that eat vegetable matter, some that feed exclusively on diatoms, some that feed on bacteria and some that eat other nematodes. Broadly speaking, the mouth parts show the same general lines of variation that insects show, some being adapted to biting, others to sucking or stinging, and it is possible that the buccal stylet of *Mononchus* serves as a poison fang to benumb the nematodes on which this genus feeds. The life histories and methods of reproduction are very variable and include parthenogenesis. Nematodes occur in the soil and in the ocean in immense numbers and have been found in the polar regions. There are probably as many species as there are of insects, and some of the well-marked genera will probably be found to have as many as 500 species.

Some of the nematodes, such as *Streptogaster*, have an anterior dilatation of the intestine which appears to be morphologically and physiologically a stomach.

Dr. Cobb gave an interesting demonstration of the method of obtaining the decimal nematode formula, showing that it could be obtained with no great effort in about six minutes.

MAURICE C. HALL,  
*Secretary*

## AMERICAN PHILOSOPHICAL SOCIETY

ON April 12th, Dr. Willis F. Manges, Röntgenologist to the Jefferson Medical College Hospital of Philadelphia, read a paper before the American Philosophical Society on the X-rays. He reviewed briefly the history of the discovery and especially noted the great progress in safety and efficiency of the apparatus and methods of to-day as contrasted with the earlier results. By means of the modern methods of protection, X-ray injury is now almost entirely eliminated. He discussed the value of the X-rays in medicine and surgery both in diagnosis and treatment. He pointed out also that interpretation of the Röntgenographs required special skill, which could only be gained by a wide experience or careful training and that there was danger in their indiscriminate use in medico-legal cases because of the difficulties of such interpretation.